



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US00/08563 <b>(22) International Filing Date:</b> 31 March 2000 (31.03.00) <b>(30) Priority Data:</b> 60/127,411 1 April 1999 (01.04.99) US <b>(71) Applicant (for all designated States except US):</b> J.E. GROTE COMPANY, INC. [US/US]; 1160 Gahanna Parkway, Blacklick, OH 43004 (US). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> CROW, Darren, W. [US/US]; 4821 Glendon Road, Columbus, OH 43229 (US). GARDNER, James, J. [US/US]; 700 East Fifth Avenue, Lancaster, OH 43130 (US). <b>(74) Agent:</b> FOSTER, Jason, H.; Kremblas, Foster, Millard & Pollick, 7632 Slate Ridge Boulevard, Reynoldsburg, OH 43068 (US).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  Published With international search report.
<b>(54) Title:</b> BLADE CLEANER FOR A CONTINUOUS LOOP BLADE ON A FOOD SLICING MACHINE  <b>(57) Abstract</b> <p>A blade cleaning device for a continuous loop blade food processing machine includes a pair of parallel but offset scrapers (10, 12) that are positioned on, and seated against, opposite sides of the blade (35) for scraping residue from the blade (35) as it passes against the scrapers (10, 12). The scrapers (10, 12) are biased against the blade (35) by springs (30, 32) mounted on scrapers arms (20, 22) that are pivotally mounted on a scraper frame (14). A pipe (40) being in fluid communication with a pump is positioned adjacent at least one of the scrapers (10, 12) to draw waste matter.</p> <div data-bbox="1068 1115 1425 1598" data-label="Image"> </div>		

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(a) TITLE:           BLADE CLEANER FOR A CONTINUOUS LOOP  
                      BLADE ON A FOOD SLICING MACHINE

(e) BACKGROUND OF THE INVENTION

1. Field Of The Invention

5           This invention relates generally to food  
slicing machines, and more specifically to a  
cleaning apparatus for cleaning the blade of a food-  
slicing machine. The cleaning apparatus is  
particularly suited to food slicing machines  
utilizing a continuous loop blade.

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2. Description Of The Related Art

Food slicing machines, such as those shown in  
U.S. Patent Numbers 3,760,715 to Grote et al. and  
4,436,012 to Hochanadel, which are incorporated by  
15 reference, use a continuous loop blade, in the  
manner of a bandsaw, to slice food products, such as  
meats and cheeses. The blade is a razor-sharp metal  
band that extends in a loop around a drive wheel, an  
idling guide wheel and through a blade guide  
20 positioned between the wheels. The blade guide  
maintains the relative position of the blade to the  
food product. The food product is reciprocated  
through the path of the blade to form slices of  
food, during each reciprocation, that fall  
25 downwardly onto a conveyor.

During the slicing of food products water is conventionally sprayed onto the blade to lubricate it. This water and a greasy food residue on the blade form a mixture that is referred to in the art as "black grease." If it is not cleaned off the blade, black grease will drip down onto food slices or the conveyor, and it will be projected by centrifugal force from the drive or guide wheel onto the machine's housing or any nearby object.

Conventionally, the method of cleaning black grease includes dismantling the machine and hand or spray cleaning. This required labor and time during which the machine was not slicing food. Furthermore, without frequent cleaning, it is uncertain whether black grease will find its way onto food product.

Therefore, the need exists for an apparatus for effectively cleaning the blade of a food slicing machine without the need to take the machine out of useful service.

#### (f) BRIEF SUMMARY OF THE INVENTION

The invention is a cleaning apparatus for a food slicing machine. The food slicing machine contemplated has a continuous loop blade driven through a path in a blade drive direction. A food product workpiece is reciprocatingly driven through the path including the blade.

The cleaning apparatus comprises a first scraper having an edge seated against a first surface of the blade. The edge of the scraper is preferably angled relative to the blade. In the preferred embodiment, a first scraper arm is pivotably mounted to the first scraper to permit pivoting of the first scraper substantially within

its own plane. The first scraper arm is pivotably mounted to a frame and has an adjustable mechanical spring mounted thereto. The mechanical spring preferably seats against the frame at a point spaced from the fulcrum of the first scraper arm for biasing the first scraper against the surface of the blade.

A second scraper has an edge seated against a second, opposite surface of the blade, and the edge is angled relative to the blade. A second scraper arm is preferably pivotably mounted to said second scraper to permit pivoting of the second scraper substantially within its own plane. The second scraper arm is pivotably mounted to the frame and has an adjustable mechanical spring mounted thereto. The mechanical spring seats against the frame at a point spaced from the fulcrum of the second scraper arm for biasing the second scraper against the surface of the blade.

The invention also preferably includes an inlet positioned adjacent the scrapers, where the inlet is in fluid communication with a pump that draws air into said inlet.

(g) BRIEF DESCRIPTION OF THE SEVERAL VIEWS  
OF THE DRAWINGS

Fig. 1 is a side view illustrating the preferred scraper frame and scrapers.

Fig. 2 is an end view illustrating the preferred scrapers abutting the band blade.

Fig. 3 is a top view illustrating the preferred embodiment of the present invention in an operable position.

Fig. 5 is a side view illustrating a preferred waste matter housing and blower housing.

Fig. 6 is a top view of the waste matter housing shown in Fig. 5.

Fig. 7 is a top view illustrating a preferred manifold for attachment of multiple scraper mechanisms.

In describing the preferred embodiment of the invention which is illustrated in the drawings, specific terminology will be resorted to for the sake of clarity. However, it is not intended that the invention be limited to the specific terms so selected and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose. For example, the word connected or terms similar thereto are often used. They are not limited to direct connection but include connection through other elements where such connection is recognized as being equivalent by those skilled in the art.

#### (h) DETAILED DESCRIPTION OF THE INVENTION

The scraper mechanism portion of the preferred embodiment of the present invention is shown in Fig. 1. A first scraper 10 and a second scraper 12 are mounted to a scraper frame 14, and are preferably made of a low friction polymer, such as that sold under the trademark DELRIN. Alternatively, the scrapers could be made of other materials, such as other polymers, metals, composites or ceramics. The first and second scrapers are pivotably mounted by bolts 16 and 18 to first and second scraper arms, 20 and 22, respectively. The first and second scraper arms are pivotably mounted to the frame by pivot pins 26 and 28 inserted through aligned apertures in the first and second scraper arms and the frame.

The scraper arms can thus pivot about the pins, which function as fulcrums, when the scrapers are displaced.

5 First and second springs 30 and 32 are adjustably mounted to the first and second scraper arms, respectively. The springs are contained within housings that are threaded into the scraper arms, and a finger extending from one end of each spring extends into abutment with the frame 14. The  
10 finger abutting the frame exerts a force against the frame, thereby tending to pivot the scraper arm about its fulcrum and bias the scraper in a direction generally toward the other scraper.

15 A gap is formed between the adjacent edges of each scraper, between which is positioned the thin ribbon of metal that is the band blade. Each scraper is biased by the springs 30 and 32 in abutment against opposite surfaces of the band blade in the gap. In Fig. 2 the band blade 35 is shown  
20 positioned between the scrapers 10 and 12, and is shown as being driven in a direction shown by the arrow 36. The scrapers' edges are in contact entirely across the width, and on opposite major surfaces of, the blade.

25 The planes that contain the scrapers are parallel and offset along the direction of movement of the band blade a distance approximately equal to the thickness of the scrapers. Thus, as the portion of scraper in contact with the blade's surface wears  
30 away due to friction, and the lateral extremes of the scraper edges that do not contact the blade (and therefore do not wear away) tend to protrude toward the other scraper, contact between the scrapers cannot occur. Contact could occur if the scrapers  
35 were coplanar. But because they are not coplanar,

but are offset, there is no contact that would cause the force by which the scrapers seat against the blade's surface to decrease.

5       The scrapers mechanically remove substantially all food, lubricant and other matter from the major surfaces of the moving blade as it passes through the gap between the scrapers and rubs against the scrapers' edges. As can best be seen from Fig. 3, the planes of the scrapers 10 and 12 are angled  
10       relative to the direction of motion of the band blade 35 to change the direction of motion of the removed "black grease" matter and direct it toward the suction device described below. The preferred angle of the scrapers relative to the band blade is  
15       substantially 45 degrees, although the angle could vary significantly. For example, the invention would function with an angle between 30 and 60 degrees, although probably not quite as well as the preferred angle.

20       A pump draws air at high speed, and with large volume flow per unit time, through a pipe 40 from an inlet that is adjacent a lateral, more downstream (relative to blade movement) edge of each scraper. The pipe 40, which is preferably an integral part of  
25       the scraper frame, has a passageway that is in fluid communication with the pump, and therefore a pressure differential is created between the pipe interior and the atmosphere.

30       The matter removed from the blade has fluid properties that permit it to flow, and as matter is removed from the band blade, it is redirected by the angle of the scrapers to the downstream edge of the scraper toward the pipe inlet. The matter flows further in the direction of flow of air into the  
35       pipe by the pressure differential, and is thereby



sucked into the pipe 40 through the inlet. After it is drawn into the pipe, the matter is deposited in waste containers.

5 The inlet of the pipe 40 is preferably connected to a fluid pump, such as a housing containing a motor and an impeller functioning as a blower as shown in Fig. 5. Air is drawn through the pipe 54 into the housing 50 and is blown out of the housing through an outlet 52 that is preferably  
10 muffled. A second, waste matter housing 60 is positioned between the inlet of the pipe 40 and the blower housing 50. The waste matter housing is shown in Figs. 5 and 6 having an inlet valve 62 that the pipe 54 connects to for drawing air through the  
15 bucket housings 70 and 80. Each bucket housing has an inlet and outlet connected to the valve 62, and each includes a removable bucket that will contain the waste matter.

The valve 62 is essentially a spool valve that  
20 is manually actuatable between two positions. In one position, air is drawn into and out of one of the buckets, and in the other position, air is drawn into and out of the other bucket. The valve 62 is in fluid communication with the pipe 40, and  
25 therefore, the position of the valve 62 determines which bucket the waste matter removed from the band blade empties into. Once one of the buckets is full, the valve 62 is manually shifted to the other position and the full bucket is emptied while the  
30 other, empty bucket is being filled with waste matter. The food slicing machine need not, therefore, be stopped while one bucket is being emptied.

Of course, it is possible to have only one  
35 bucket or more than two buckets. It is also

contemplated that the tubes or pipes through which the waste matter flows to the waste matter housing 60 are heated to retain the fluid properties of the waste matter. Because the waste matter is made partially of grease, the grease should be kept warm enough to retain its fluid properties until at least it is deposited into the bucket or other suitable receptacle. If the grease is not kept warm enough in its environment, then trace heating may be necessary.

A plurality of scraper mechanisms can be positioned at spaced positions along the band blade by connecting each scraper mechanism to a manifold with which the blower is in fluid communication. Such an array of scraper mechanisms can be mounted to the manifold 90 shown in Fig. 7, and such a manifold preferably has a fluid connection with the waste matter housing 60.

At a minimum, there is preferably at least one scraper mechanism positioned so that the band blade passes between the scrapers just after making a cut of food. This is ordinarily just past (or downstream of) the blade guide. It is also possible, and contemplated, to have a pair of scrapers and a suction pipe inlet integrated into the conventional blade guide or positioned just before the blade enters the blade guide. Additionally, a plurality of water injection nozzles can be positioned at the entrance and exit of each blade guide. A person of ordinary skill in the art will understand that the position of the scraper mechanism also can be changed according to the type of food product being cut or the desired cleanliness of the food cutting area.

As the band blade passes through the gap between the scrapers, its position relative to the scraper frame often rapidly changes due to the high speed of travel (approximately 30 feet per second) and the relative thickness of the band blade. Any component of movement of the blade perpendicular to the plane of the blade can be accommodated by the pivotably mounted scrapers and scraper arms, which permit movement of the scrapers in arcuate paths perpendicular to the blade's plane. The springs mounted to the scraper arms bias the scrapers against the blade's opposing major surfaces with a force directed substantially perpendicular to the blade, and any small displacements of the blade result in displacement of one scraper in the same direction, which results in compression of its spring, and displacement of the other scraper in the same direction, which results in release of its spring. The springs thus keep the scrapers biased against the blade's opposing surfaces during any variations in blade position, and maintain the scrapers in contact with the band blade as it returns to its median position. The pivotable mounting of the scrapers to the scraper arms therefore permits the scrapers to pivot and keep an entire edge in contact with the blade at all times. The amount of force the springs apply to the scraper can be adjusted by rotating the spring mechanism in one direction or the other.

The entire scraper mechanism can be removed easily from the band blade simply by pivoting together the ends of the scraper arms opposite the scrapers. A locking latch 100, as shown in Fig. 1, extends between the ends of the scraper arms and latches one end of the lower scraper arm to the end

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of the other scraper arm in the open position to permit the scraper mechanism to be removed from the band blade area. After clamping the scraper arms open, the screw 102, shown in Fig. 3, is removed, and then the pipe 40 is detached, preferably by a conventional quick disconnect, from the manifold (not shown in Fig. 3). The scraper mechanism can then be removed.

While certain preferred embodiments of the present invention have been disclosed in detail, it is to be understood that various modifications may be adopted without departing from the spirit of the invention or scope of the following claims.

## CLAIMS

1. A cleaning apparatus for a food slicing machine, said food slicing machine having a continuous loop blade driven through a path and a food product workpiece reciprocatingly driven through the path including the blade, said cleaning apparatus comprising:
- 5 (a) a first scraper seated against a first surface of the blade;
- (b) a second scraper seated against an opposite, second surface of the blade;
- 10 (c) a pipe having an inlet positioned adjacent at least one of said scrapers, said pipe being in fluid communication with a pump that draws air into said pipe for drawing waste matter into the pipe.
- 15
2. A cleaning apparatus in accordance with claim 1, wherein the first and second scrapers are movably mounted seating against the blade.
- 20
3. A cleaning apparatus in accordance with claim 1, wherein the first and second scrapers are biased against the blade.
- 25
4. A cleaning apparatus in accordance with claim 1, wherein the first and second scrapers are substantially planar and contained within first and

second planes, respectively, said planes being substantially parallel and noncoplanar.

5        5. A cleaning apparatus in accordance with claim 4, wherein the planes are substantially perpendicular to the blade and angled relative to a blade drive direction, for directing any waste matter to a downstream end of the first scraper and a downstream end of the second scraper.

10

6. A cleaning apparatus in accordance with claim 5, wherein said pipe inlet is mounted near the downstream ends of the scrapers.

15

7. A cleaning apparatus for a food slicing machine, said food slicing machine having a continuous loop blade driven through a path in a blade drive direction, and a food product workpiece reciprocatingly driven through the path including the blade, said cleaning apparatus comprising:

20

(a) a first scraper having an edge seated against a first surface of the blade, said edge being angled relative to the blade drive direction;

25

(b) a first scraper arm pivotably mounted to said first scraper for permitting pivoting of the first scraper substantially within a plane of the first scraper, said first scraper arm being pivotably mounted to a frame and having an adjustable spring mounted thereto and seating against the frame at a point spaced from the fulcrum of the first scraper arm for biasing the first scraper against the surface of the blade;

30

(c) a second scraper having an edge seated against a second, opposite surface of the blade,

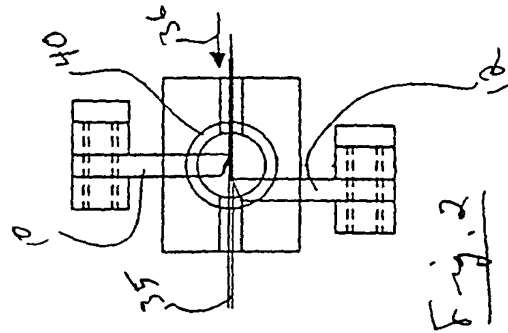
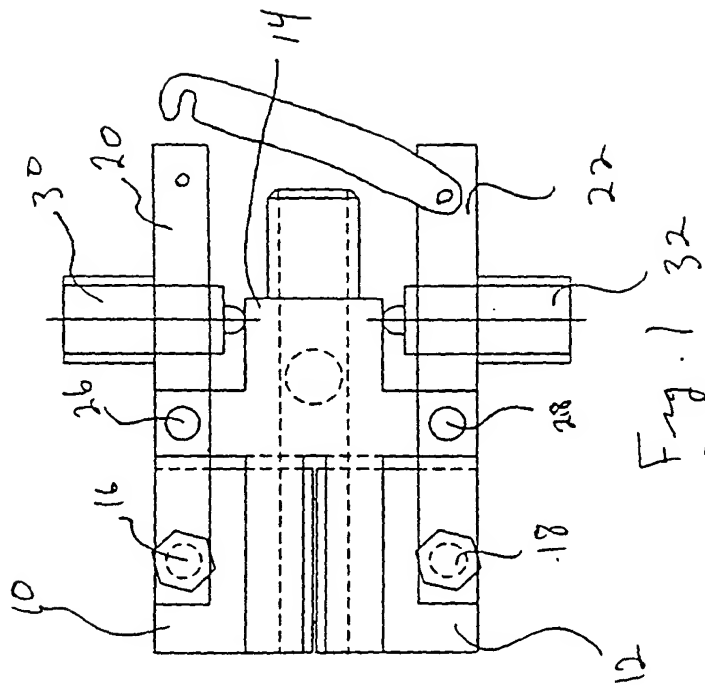
said edge being angled relative to the blade drive direction;

5 (d) a second scraper arm pivotably mounted to said second scraper to permit pivoting of the second scraper substantially within a plane of the second scraper, said second scraper arm being pivotably mounted to the frame and having an adjustable spring mounted thereto and seating against the frame at a point spaced from the fulcrum of the second scraper arm for biasing the second scraper against the surface of the blade;

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(e) a pipe inlet positioned adjacent the scrapers, said pipe inlet being in fluid communication with a pump that draws air into said pipe.

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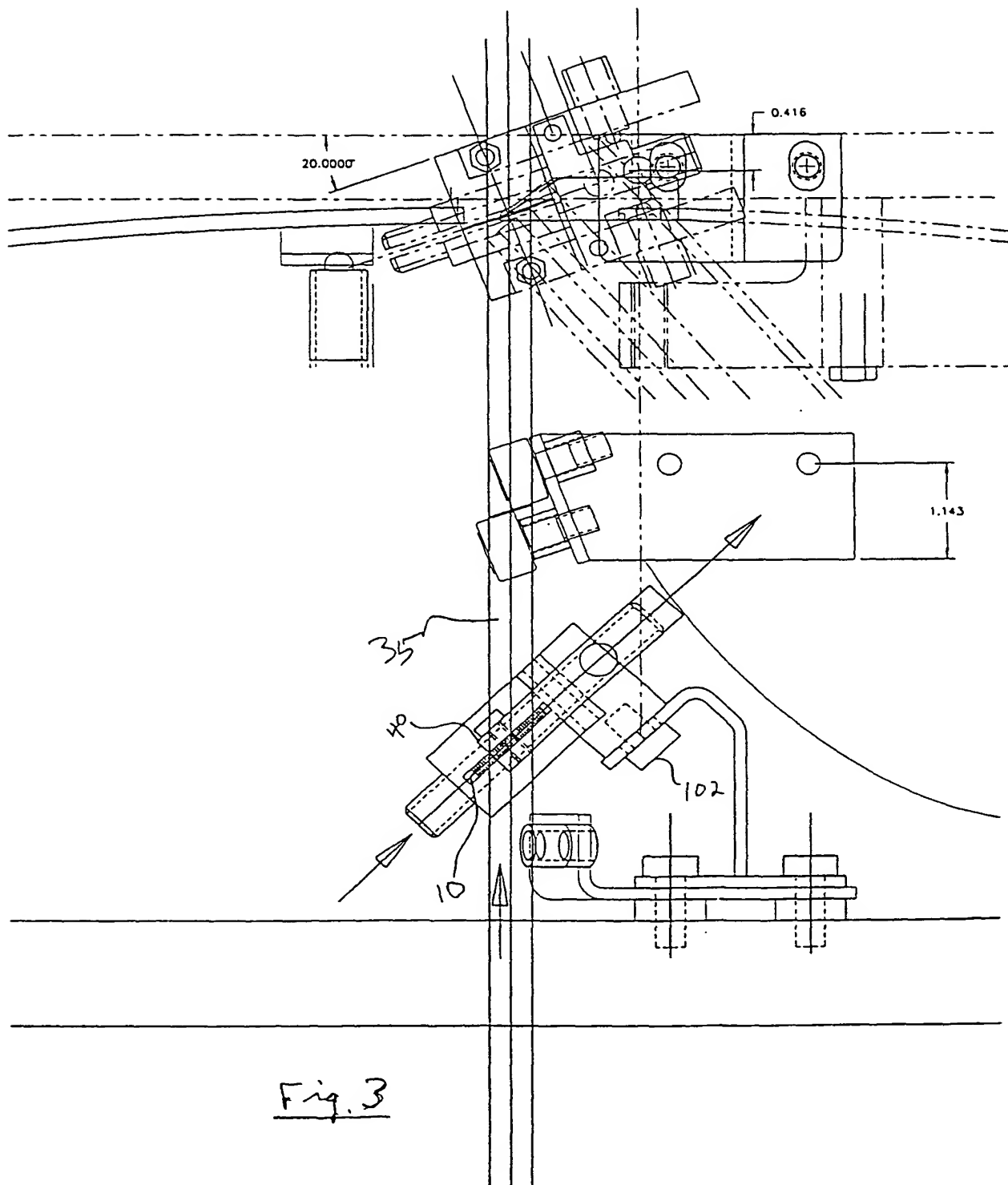
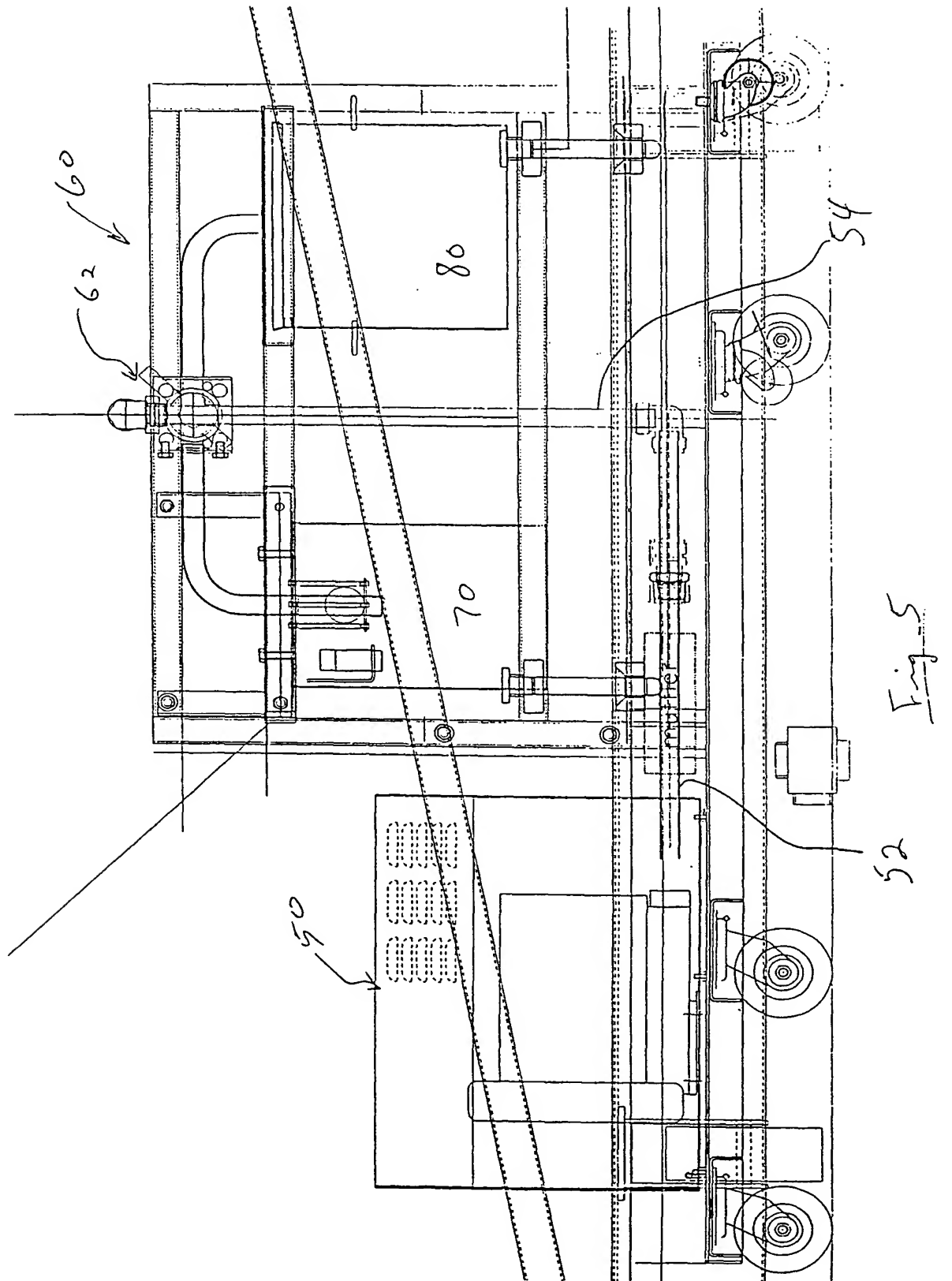


Fig. 3



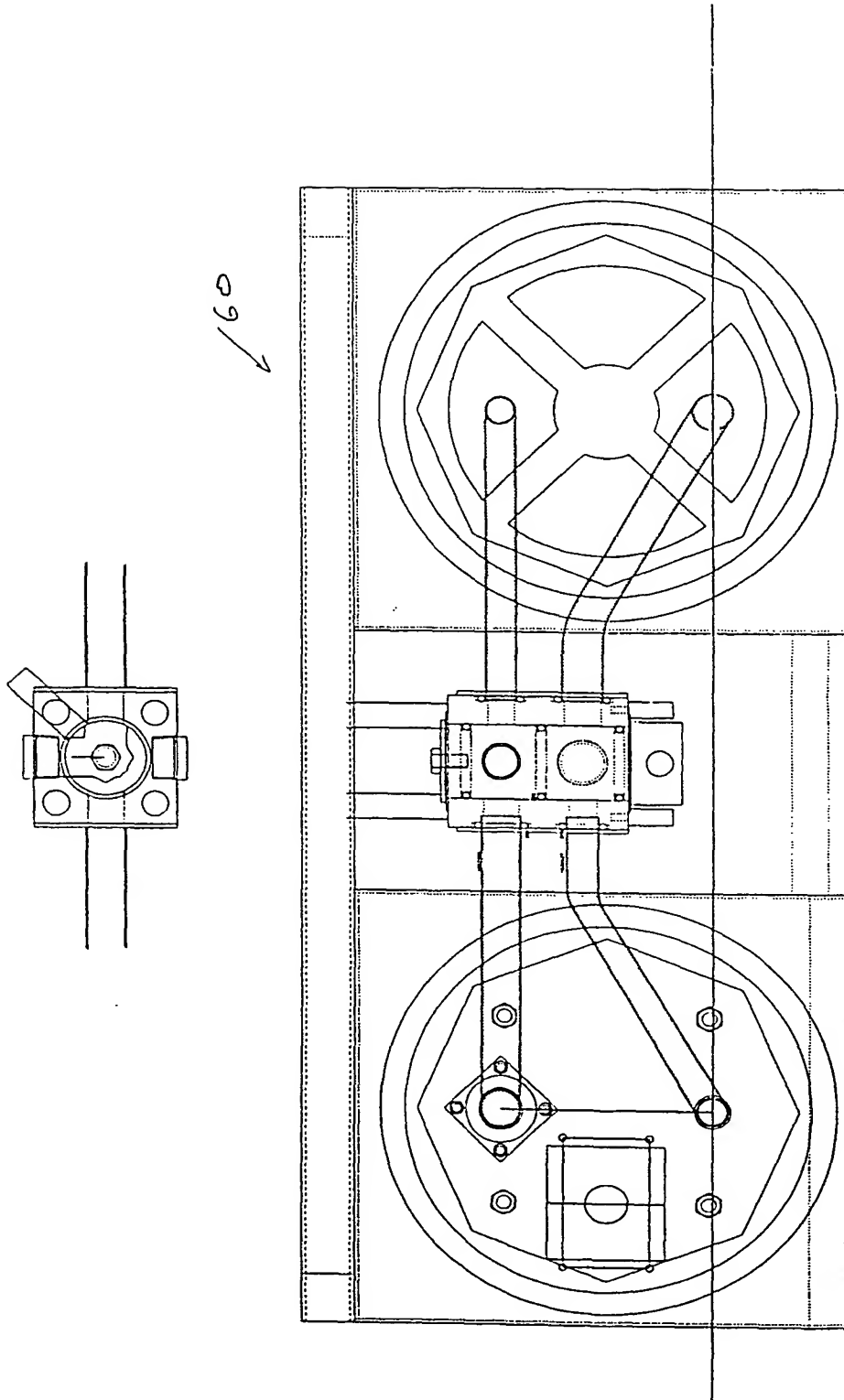


Fig. 6

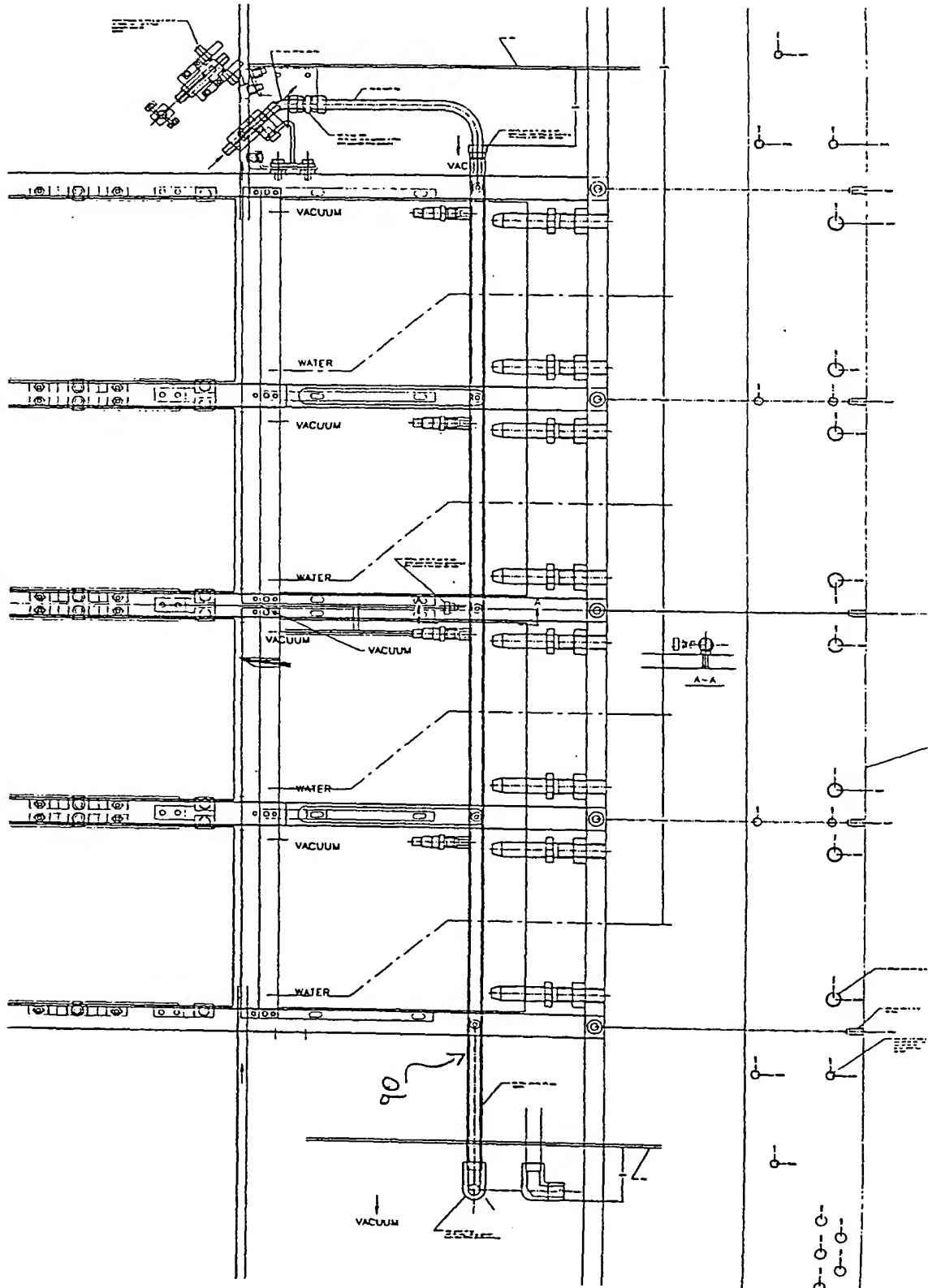
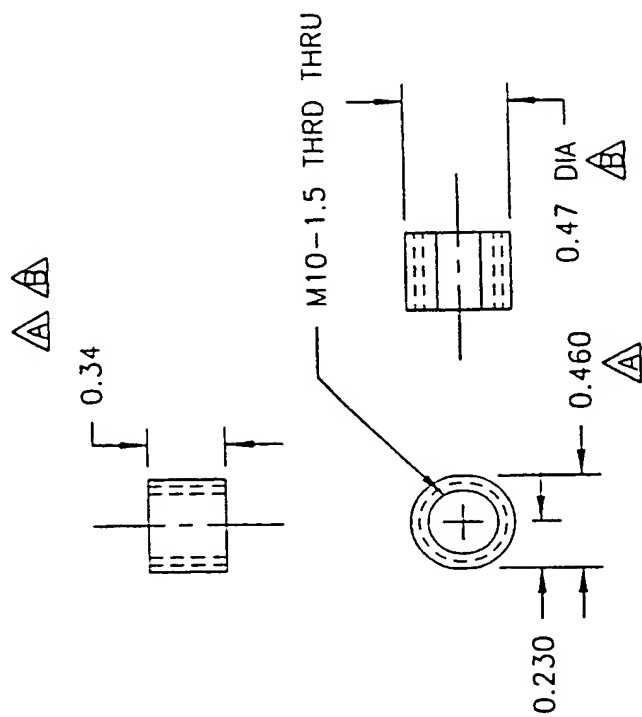
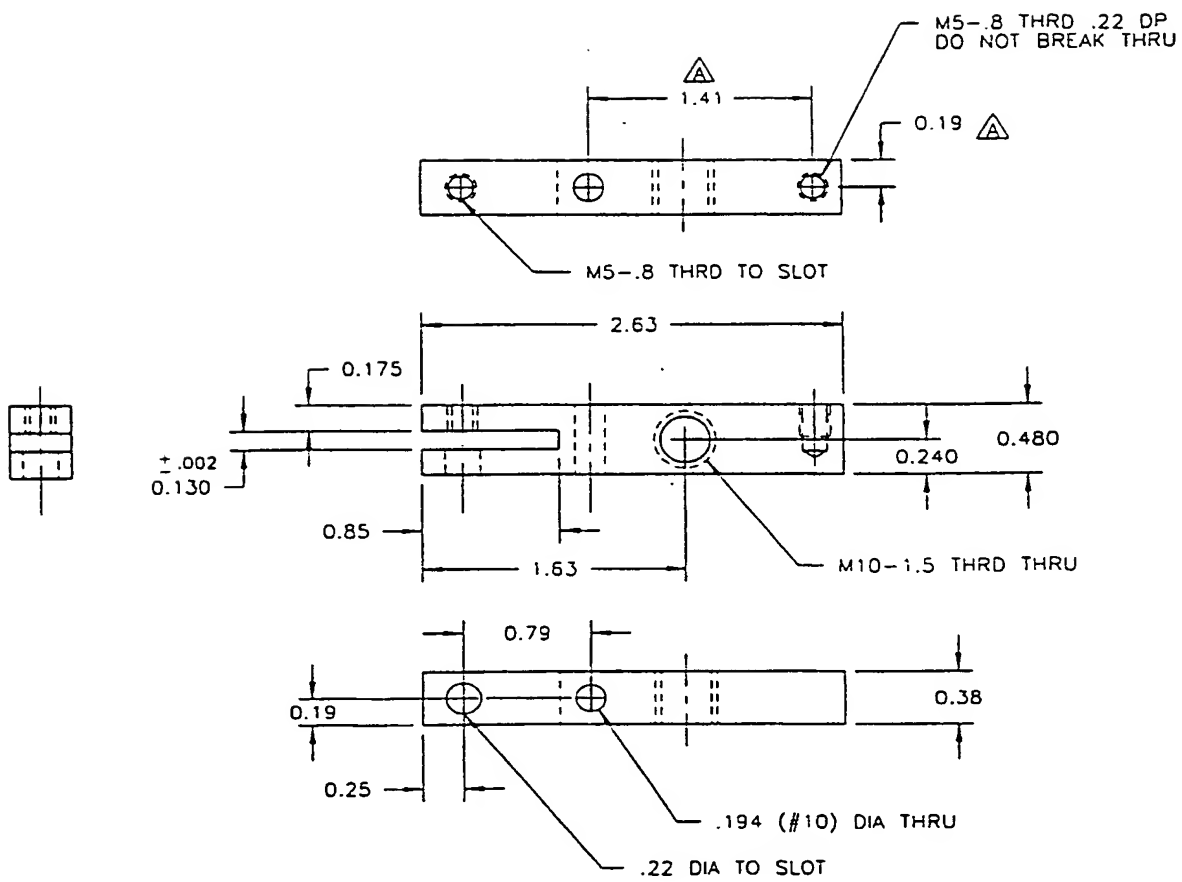
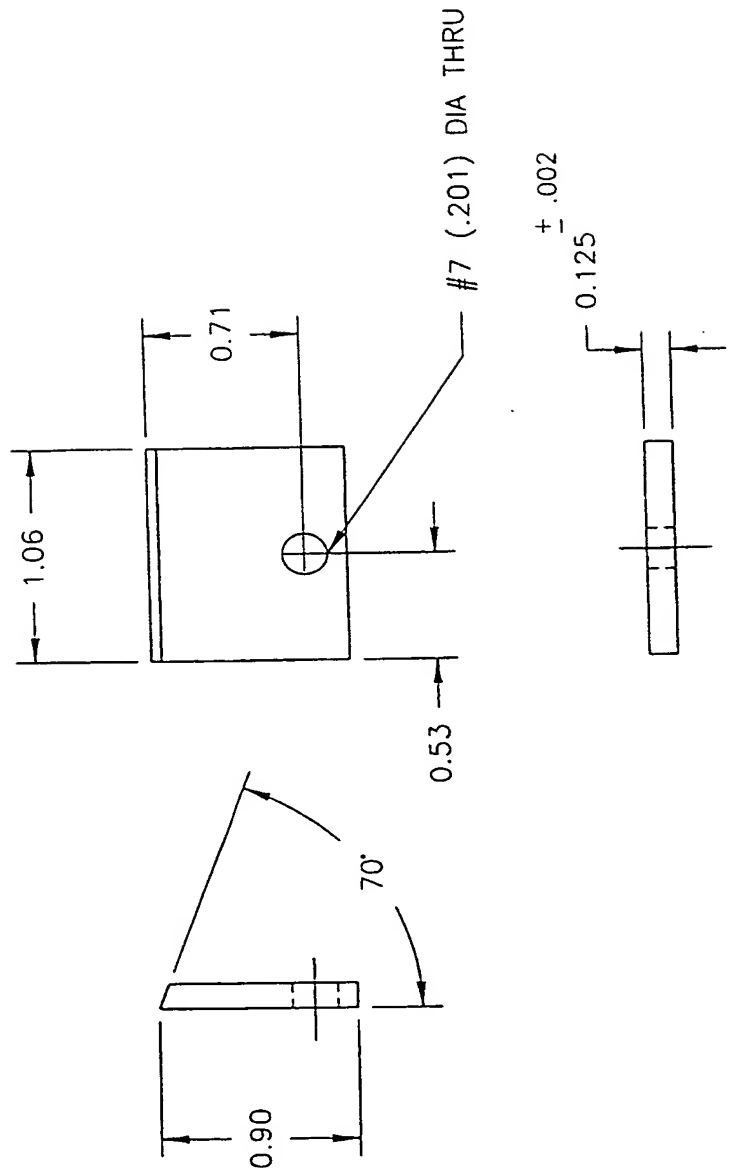


Fig. 1











# INTERNATIONAL SEARCH REPORT

Inter. national application No.  
PCT/US00/08563

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : B26D 7/08; B23D 53/00

US CL : 83/168, 100, 788

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 83/168, 100, 788

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,235,885 A (CAMARENA et al) 17 August 1993, Figure 5.	1-7
Y	US 3,669,163 A (CRANE) 13 June 1972, Figure 2.	1-7
Y	US 1,870,774 A (GAINES) 09 August 1932, Figure 3.	1-7
A	US 1,908,727 A (BLEAM) 16 May 1933, Figure 5.	1-7
A	US 4,491,047 A (BUTKIEWICZ et al) 01 January 1985, column 6.	1-7
A	US 4,312,253 A (JOHNSON et al) 26 January 1982, Figure 7.	1-7



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/08563

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3,485,123 A (KOMENDOWSKI) 23 December 1969, Figure 3.	1-7
A	US 659,088 A (McKENZIE) 02 October 1900, Figure 5.	1-7
A	US 1,861,412 A (OLIVER) 31 May 1932, Figure 1.	1-7
A	US 4,372,185 A (PILA) 08 February 1983, Figure 6.	1-7
A	US 5,109,744 A (SYRE et al) 05 May 1992, Figure 6.	1-7
A	US 4,318,323 A (VOORHEES et al) 09 March 1982, column 4.	1-7